# THE HISTORY OF NEUROLOGY IN THE LAST ONE HUNDRED YEARS*

HENRY R. VIETS

Lecturer on Neurology, Harvard Medical School

NEUROLOGY may be considered from differing viewpoints, for in its broadest aspects neuroanatomy, neurophysiology, neuropathology, neurosurgery and clinical neurology are integral parts of the larger concept. One might, with some justification, even include psychiatry, a disease of the nervous system, and therefore within the dictionary definition of neurology as "the scientific study or knowledge of the anatomy, functions, and diseases of the nerves and the nervous system."[1] But such an encyclopedic designation reverts to the late seventeenth century and is not applicable to the nineteenth, when specialization was beginning and the neurologist was no longer primarily concerned with anatomy and physiology, his main efforts being directed to disease and injury as they affected the nervous system of man. The term neurologist indeed dates from 1832, the year that Romberg introduced the work of Sir Charles Bell to his Berlin audience. By circumscribing its field of activity neurology did not by any means lose contact with anatomy or physiology. The best in modern neurology has developed hand in hand with the basic sciences as witnessed by the work of Cajal and Sherrington in the laboratories, Charcot and Cushing in the clinic. Thus, although we should not delimit our subject in general, time only permits a brief review of the clinical aspects of neurology in the last one hundred years and a survey of the leaders who made the most significant contributions. Should you desire to go further you will find that other and more able hands have penetrated deeply into the subject of the growth of our specialty. I refer to the well-documented "History of Neurology," by Fielding H. Garrison;[2] "Fifty Years of American Neurology," by Smith Ely Jelliffe;[3] the "Introduction to the History of Neurology," by Israel S. Wechsler[4] and the many important papers

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in the *Foundation Volume Published for the Staff, to commemorate the Opening of the Montreal Neurological Institute, of McGill University*, 1936.[5]

*Moritz Heinrich Romberg (1795-1873):* The growth of clinical neurology as a specialty is almost exactly one hundred years old for Romberg was the first physician to give particular attention to the structural diseases of the nervous system, and neurology as we know it today, in practice and in the clinic, developed only after he published the first edition of his *Lehrbuch der Nervenkrankheiten*,[6] the first volume in 1840 and a final one in 1846. The book, unique in content, soon passed into a second and later a third edition.

Born in 1795, Romberg had completed his usual medical studies at the age of 22 when he selected the study of the diseases of the nervous system as the object of his life and the goal of his researches. He was much influenced by English authors and one of his first duties as a young man was to translate into German[7] a book by the London anatomist, Andrew Marshal, on *The Morbid Anatomy of the Brain, in Mania and Hydrophobia.*[8] Marshal, born in Scotland, had become a pupil of William Hunter in Great Windmill Street, London, where John Hunter was also lecturing on surgery. He practiced medicine in London and lectured on anatomy. The book that Romberg chose to translate was published in 1815, two years after Marshal's death, edited by Dr. Sawrey, his former assistant lecturer. Marshal's chief activities were concerned with his school of anatomy in the Thavies Inn in London and in the practice of medicine. Marshal described the gross appearance of the brains of patients who had died of mania at the Bethlem Hospital and proved to his own satisfaction that the structure of the brain was always grossly altered, due, in his opinion, to defective circulation. He found fluid in the cerebral ventricles and erroneously interpreted this as a sign of disease. The book does not seem to be of any considerable importance at the present time but perhaps it stirred the young Romberg on to better things and, at least, it introduced him to contemporary English neuroanatomy and neuropathology. He was thus led to the work of Sir Charles Bell who became his guide in neurological research.

Of more importance, therefore was his translation of Bell's *The Nervous System of the Human Body*, which had appeared in London in 1830 and was promptly put into German by Romberg in 1832, with

the fine plate showing the trigeminal, facial and vagus nerves.[9] This was a much more noteworthy contribution than the book by Marshal, for it brought to the German-speaking world one of the great landmarks in neurology. Romberg was conscious of this for he states, "the researches of Sir Charles Bell fill me with enthusiasm, and in 1831 I translated his great work and made known to my professional brethren in Germany his investigations which will ever serve as models of scientific inquiry." In this book Bell demonstrated the motor and sensory character of the trigeminal nerve and separated it from the facial nerve with which it had previously been confused.

The value of Romberg's translations and his demonstrated interest in diseases of the nervous system was soon recognized and he was invited to lecture on neurology at the University of Berlin as early as 1834. In 1840 he was appointed director of the wards of the University Hospital and there he began his studies of patients, observations that were recorded in various editions of his famous textbook, then in the course of preparation.

The discovery of the motor function of the anterior root by Sir Charles Bell in 1811, the elucidation, with experimental proof, of the functions of both the anterior and posterior roots by Magendie in 1822 and the acceptance of the difference between sensory and motor nerves by Bell in 1826, led to a division of Romberg's textbook into two sections, one on sensation and the other on motion. In the sensory section there are excellent descriptions of neuritis, causalgia, neuromas, facial neuralgia, ciliary neuralgia, sciatica, and many other conditions which we recognize today, each clearly illustrated by case histories and with full references to the literature. The section on motor disease is largely given over to a description of muscular spasm, particularly those concerned with breathing and talking. The space given to this would seem inordinately large according to present day standards. Later in the same volume are found descriptions of chorea, tetanus, epilepsy, facial paralysis, and finally tabes dorsalis, with a note on the famous sign which goes by Romberg's name. Romberg does not clearly differentiate spinal from peripheral nerve disease and classified lead poisoning among the diseases of the spine. There are various examples of intrinsic degenerative disease of the spinal cord but the differentiation of these was left for others.

Romberg's description of tabes dorsalis discloses his great power of

observation. For example, the sensory alterations in tabes dorsalis are thus recorded: "The feet feel numb standing, walking, or lying down and the patient has the sensation as if they were covered with fur. The resistance of the ground is not felt as usual; its cohesion seems diminished and the patient has the sensation as if the sole of his foot were in contact with wool, soft sand or a platter filled with water. The rider no longer feels the resistance of the stirrup and has the strap put up a hole or two." This was no theorizing. Romberg was actually talking in terms of patients he had examined and for the first time in a consecutive orderly manner under the covers of one book we begin to get a clear picture of clinical neurology.

The text of Romberg's book was not translated into English as rapidly as Romberg had translated Bell's treatise in German, for it was not until after the second German edition of 1851 that an English edition was issued in London in 1853.[10] The rendition, however, was excellent and the volumes had a wide influence not only in Great Britain, but also in America.

The original idea for the book came from Romberg's admired predecessor, Sir Charles Bell, who wrote, in 1811: "I fear it will be a long time before combined efforts will enable a medical author to arrange and accurately describe the diseases of the nervous system. The position we at present occupy is but a very inferior one." Romberg did not forget these words, and by 1840 the first part of his book was ready for the press. The text was based on physiological principles, for Romberg examined the literature of his day with great completeness. He collected and incorporated the scattered reports on experimental investigations into his precise clinical pictures of neurologic diseases.

Romberg's fame not only rests on his textbooks but on his superb definition of the clinical aspects of tabes dorsalis and his brilliant pathological surmise, based on direct observations, "that the posterior sensory roots are occasionally alone affected in conjunction with the posterior of the spinal cord, the anterior motor column and nerve retaining their normal structure." Although many of the clinical symptoms had been noted by others, Romberg, using the observations of others and those of his own, wrote the classical description of the disease. For this he deserves enduring fame.

*Duchenne de Boulogne (1806-1875):* Guillaume-Benjamin-Amant

Duchenne, the strangest figure that ever entered the field of neurology, labored under a great disadvantage, for he cared little for book knowledge and knew nothing in his early and most productive days of the work of Romberg and his other contemporaries. He therefore started his clinical career by himself and continued as a solitary investigator during his entire life. Such isolation might be considered a handicap to an ordinary man, but Duchenne was far from orthodox. The results of his solitary studies were so outstanding that we may agree with Joseph Collins' clever characterization: he found neurology "a sprawling infant of unknown parentage which he succored to a lusty youth."[11]

Duchenne, a strong fisherman type from Boulogne, had no hospital appointment in Paris and sought none. Typically a man devoted to bedside observations, he never expended his energies on lecturing. Duchenne had no special talent for the pursuit of morbid histology, although he was one of the first to use photography as a means of preserving microscopic pictures. Going from hospital to hospital, ever talking to and examining patients, this persistent investigator even followed patients into their homes. At first he was received with considerable skepticism by the medical profession of Paris but slowly his reputation and his superiority in clinical observation was soon widely accepted. Duchenne finally became known as an honest, hard working original discoverer, a skillful professional man and a kind-hearted benevolent gentleman.[12]

Duchenne's first book of importance, published in 1855, was *De l'électrisation localisée*.[13] There was a second edition in 1861 and a third in 1872. His clinical observations were not only published in the medical journals of the day but gradually added to the various editions of his book on electrotherapy. The first edition contained almost no clinical observations but when the third was published in 1872 the bulk of the clinical work of Duchenne was incorporated into this work. All editions contain his work on electrical stimulation of the muscle, the elucidation of the mechanism of facial expression and the complete review of muscular function as depicted by stimulation of the muscle itself. The third edition of this book is the one most useful to the clinician. The first part reached England in 1870 before the German army had entered Paris. This was promptly translated[14] and came out before the third French edition. The clinical works, contained in the second part, were not issued in English until 1883.[15]

Duchenne's contribution to neurology is signalized by his clinical descriptions of progressive muscular atrophy, poliomyelitis, tabes dorsalis, glossolabiolaryngeal paralysis and pseudo-hypertrophic paralysis. These observations cannot be said to be entirely original with Duchenne but their value lies in the fact that Duchenne put together into clinical entities the various aspects of the diseases under consideration. This is particularly true in tabes, which he called progressive locomotor ataxia, thus improving the somewhat unfortunate name, tabes dorsalis, given to it by Romberg. Duchenne added to Romberg's description of the symptoms; indeed he made his word picture so complete that hardly anything has been added to it since his day except the joint and bone manifestations, the trophic disturbances and, of course, the absence of the deep reflexes and the pupillary abnormalities. These were supplied at a later period by Charcot, by Westphal and by Argyll-Robertson. Duchenne, moreover, described some of the earliest symptoms of the disease. There was always some doubt in his mind whether the disease as noted by him was the same as the advanced tabes dorsalis described by Romberg.

Duchenne also described fully and accurately the symptoms and signs of progressive muscular atrophy. He studied the pathology of the atrophic muscles, pointing out the fatty changes that he thought characteristic of the most common form. He also noticed the atrophy of the cells in the anterior horn but he was never sure whether the cord lesions were primary or secondary. It was left to Charcot, with his better apparatus, to solve this problem. Of more importance is Duchenne's fine demonstration of the atrophy of the anterior horn in poliomyelitis. He parallelled his observational studies in the hospital with pathological studies of the spinal cord tissue.

These are Duchenne's chief contributions to neurology but he made lesser additions, particularly in his clinical descriptions of diphtheritic paralysis, the hysterical states, contractures of the diaphragm and peripheral nerve injuries. He studied the mechanism of expression by electrical stimulation of muscles and developed ingenious prosthetic devices for injured hands.

Duchenne, by constant probing at the bedside for thirty years, described clearly for the first time a number of important neurological diseases. We are all indebted to this extraordinary man whose devotion to neurology should never be forgotten. He, even more than Romberg,

stimulated the development of our specialty, for he initiated the great school of French neurology on which so many of our present concepts of neurological diseases are based.[16] Without his two great friends in Paris, Trousseau and Charcot, however, much of Duchenne's work would never have reached publication, for he was absentminded and inarticulate in the public expression of his ideas. Charcot, one of the most eminent practicing physicians of his time and a greater neurologist than Duchenne, was not, however, unmindful of Duchenne's accomplishments and was ever ready to help him make his discoveries known.

*Jean-Martin Charcot (1825-1893):* The greatest neurologist of all time, Charcot's name will always be associated with his old hospital in Paris, the Salpêtrière. The hospital got its queer name from the fact that it once served as an arsenal and thus became a center for the storage of saltpeter, the essential ingredient of gunpowder. Sometime in the 17th Century it was converted into an asylum for old women and later, after Pinel's time, into a hospital for the mentally disturbed, epileptics and patients with a wide variety of nervous diseases. To this hospital in 1848 came the young Charcot as a medical student, the son of a professional carriage builder who had considerable artistic talent, an inheritance that became well marked in his famous son. As a boy the young Charcot had become proficient in at least three languages besides French: English, Italian and Dutch. After four years of internship at the Salpêtrière, Charcot practiced medicine for a few years before returning in 1862 to his old hospital as one of the chiefs of the medical service. His early work, indeed, was in general medicine, studies on gout, rheumatism, diseases of the heart, lungs, liver and kidneys and particularly the delineation of the pathological condition associated with old age. One of his first concerns was to establish a pathology laboratory at the Salpêtrière. From a single small room granted him for this purpose came some of the greatest discoveries ever made in neuropathology. Charcot began at the very onset of his career, unlike his friend Duchenne, to examine the tissues of the nervous system. His elucidation of the morbid changes associated with the clinical states that he saw in the wards, proceeded in rapid succession. He demonstrated the changes in the anterior horn cell in poliomyelitis, already noted by Duchenne, and in progressive muscular atrophy; then came the studies on miliary aneurysm and the role it played in the causation of cerebral hemorrhage and finally his work on cerebral hemorrhage

itself and softening of the brain. In addition, he delineated clinical aspects of tabes dorsalis improving greatly on the descriptions of his predecessors and for the first time, described the gastric crises and the arthropies. There followed a long and detailed study on tremors in which he dissociated the tremor of paralysis agitans from that of multiple sclerosis and put tremor, which had hitherto been regarded as a disease, into the status of a symptom. He demonstrated the plaques in multiple sclerosis and clearly set forth the clinical aspects of this disease. Charcot described accurately the pathological changes in the spinal cord in amyotrophic lateral sclerosis and indicated the chief symptoms in the peroneal type of muscular atrophy. His crowning achievement in neuropathology was his studies in cerebral localization. Basing his work on the animal experiments of Hitzig in Germany and those of Ferrier in England, Charcot delineated the pre-rolandic cortex, the internal capsule and particularly the blood supply of the capsule itself.

Such were the fundamental studies that came out of the pathology laboratory established at the Salpêtrière in 1862. His name is remembered in the artery of Charcot, Charcot's disease, amyotrophic lateral sclerosis and the changes in the joints in tabes dorsalis. Although his reputation as a teacher in part is associated with his demonstrations of the psychoneuroses, from the point of view of neurology, he must be considered as the greatest contributor to our knowledge of structural disease of the nervous system. Charcot was a man of great personal charm, an ardent student of literature, an artist of distinction, a man of great intelligence and industry. He was, indeeed, the founder of modern neurology and his studies in cerebral localization led directly to the development of neurosurgery.

Many memoirs have been written about Charcot. One of the best, based on personal observations, is by Allen Starr, read before the New York Neurological Society the year of Charcot's death, 1893.[17] A more extensive and critical account was given by F. H. Garrison at the time of the Charcot Centenary in 1925.[18]

*John Hughlings Jackson (1835-1911):* Like Duchenne, Hughlings Jackson was a clinical neurologist. Never an experimentalist, he sought his facts in the patient and integrated those facts into broad concepts of disease. He allowed the experiments to be made by nature and studied their results on the nervous system of man. The son of a Yorkshire farmer, Jackson qualified as a physician in 1866 at the St.

Bartholomew's Hospital in London about the time that Charcot was finishing his internship at the Salpêtrière in Paris. He almost decided to go into philosophy but Jonathan Hutchinson persuaded him to come up to London from York, where he had settled after qualifying as a physician. His chief hospitals in London were Queen Square and the Moorfields Eye Hospital. It was at the latter institution that he first became interested in the ocular changes associated with disease of the nervous system and he introduced the ophthalmoscope to neurology. His methods of work were something like those of Duchenne. He made careful observations, tabulated all the facts, put them into their proper perspective, but finally went further than Duchenne in the generalization of principles. He wrote over three hundred papers that covered an enormous field of reports of individual cases, pathological investigations and physiological studies. A philosophical trend is evident in most of his papers; some are dull and ponderous, but the facts are clear and from them are built up reasoned principles based on sound logic.

Jackson contributed three important concepts to neurological thought: the type of epilepsy that goes by his name, his theory of aphasia and his doctrine levels of function of the nervous system.

His studies on epilepsy began early in his career, about 1865, and continued into the twentieth century. The conception of focal seizures came to Jackson slowly and was not published in its full form until 1874-76. In his studies on speech defects he recognized the previous work of Broca on localization. His chief contribution to the complex question of aphasia was his insistence that mental images may be unaffected in the majority of cases.[19] Later in his life Jackson developed his hypothesis of "levels" (spino-medullary, cortical and prefrontal), based on the observation that the evolution of the nervous system is from the simple to the complex. In nervous diseases the opposite is seen, for the highest and most complex functions are often the first to disappear, leaving the simple and lower level functions in evidence. As a corollary to this, Jackson established that negative or destructive lesions do not produce positive symptoms; these are the outcome of the action of normal structures, acting without the control or restraint of the more highly developed structures of the higher levels.[20]

Much of his work, owing to the language in which it is written with a heavy philosophical tinge, was lost to his contemporaries. But, as Sherrington wrote: "Compact in Hughlings Jackson was a fine vein

of pithy thought and phrase. Among its memorable examples stands that figure of the nerve centres as rising in three tiers or levels. It gained common usage, and is witness to its author not least in the tacit and complete assurance that neural organization and coordination are inseparably one."[21]

Some of Jackson's most important contributions appeared in obscure medical journals and it was not until his papers were collected and analyzed that his real contributions were incorporated into neurological thoughts.[22] He stimulated a brilliant group of students; among them may be mentioned Henry Head, Gordon Holmes, James Collier, Kinnier Wilson, Edwin Bramwell, Risien Russel, James Taylor and others, all familiar to neurologists of the present generation.

*Wilhelm Heinrich Erb (1840-1921):* Quite different from Hughlings Jackson or Charcot was the most brilliant clinical neurologist of the latter part of the nineteenth century, Wilhelm Erb. Born in 1840, the son of an obscure woodsman, Erb began his medical studies at Heidelberg where he became a serious hard working student, first in the field of pathology and internal medicine and later in clinical neurology. It was Friedreich in 1867 who gave him the stimulus to become a neurologist and his first work was on the pathology of peripheral paralysis, a subject that remained of greatest interest to him throughout his life. Within ten years he had published two important books, one on the diseases of the peripheral nerves and another on diseases of the spinal cord and medulla. Stimulated by the work of Duchenne, he became interested in the diagnostic and therapeutic aspects of electricity, and described the reaction of degeneration that now goes by his name. His work in this field resulted in a book on *Electrotherapy*, published in 1882. He was carried too far into this aspect of neurology but he made greater and more fundamental contributions in his study of the muscular atrophies and dystrophies, defined myasthenia gravis and the juvenile form of progressive muscular atrophy. He was quick to recognize the relationship between tabes dorsalis and syphilis, pointing this out to Nonne, who was his assistant, as early as 1885, twenty years before the discovery of Schaudinn and Wassermann. Erb, with Schultze, founded the *Deutsche Zeitschrift für Nervenheilkunde* in 1891 and became the first president of the German Neurological Association.

Perhaps his greatest gift to neurology was in the field of teaching,

for it is to Erb we owe the development of an orderly and systematic manner of examination, so fundamental to diagnosis. He pointed out, too, the importance of the changes in the reflexes as a sign of disease. He succeeded, moreover, in making neurological instruction an integral part of the medical curriculum at Heidelberg.[23]

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On this occasion we have thus considered only five figures, Romberg, Duchenne, Charcot, Jackson and Erb, in our review of neurology of the last one hundred years. These men influenced neurology the most, but no one would minimize the impact of neurological thought of their colleagues and pupils—Trousseau, Marie, Dejerine, Babinski and Guillain; Goldflam, Strümpell and Oppenheim; Allbutt, Gowers, Head, Holmes and Horsley; W. A. Hammond, Weir Mitchell, Keen, Dercum, Sachs, Putnam, Dana, Cushing and Jelliffe. Nor can we overlook the influence of Bernard, Pavlov and Sherrington in physiology; Nissl, Alzheimer, Golgi and Cajal in neuroanatomy; Quincke, Röntgen, Ehrlich, Cannon, Langley, von Economo, Dandy, Berger, Ayer, Thomsen, Froin, Forestier, and a host of others who make our daily hospital and consulting room life possible. The advance of knowledge in neurology, as in other disciplines, is mainly the result of individual effort. Great discoveries often are arrived at under conditions far from ideal. Charcot's little room for pathological study, Oppenheim's small desk where he wrote the greatest of neurological textbooks and Duchenne's dreary ward visits were the starting points of momentous advancements. May we take notice and so do our daily tasks, under whatever environment that God put us, so that we may be worthy successors to our forebears, a few of whose names have served to inspire us on this centennial anniversary.

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